NIST USMS Effort

Status Briefing
for the NIST Visiting Committee on Advanced Technology

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Six months ago today I briefed you on the approach that NIST had developed for an assessment of the nation's measurement system that it had initiated

At that time you as a committee had what I took to be serious reservations about aspects of that approach

Today I would like tell you where we have gone with the assessment, having been aware of your reservations

Contents

- Review of Goal, Objective, Rationale
- Report on the Process of the Assessment
- Summary of Status and Plan
- Conclusion

What and Why of Technological Innovation

Technological innovation is that part of the innovation process that deals with introduction into the marketplace of new technology

Technological innovation is a major source of the nation's economic well-being and military strength

Technological innovation is a basis for increased competitiveness, productivity, and quality

According to the U.S. Council on Competitiveness, "Innovation will be the single most important factor in determining America's success through the 21st century"

Rationale for NIST Engagement in Technological Innovation

NIST as the National Institute of Standards and Technology was established by the Technological Competitiveness Act of 1988

The NIST USMS effort had been initiated with the proposition that *the USMS is a key component of the US infrastructure for innovation*

The new NIST Director has stated the mission of NIST to be *to support U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology*

He has established as the first of the NIST strategies for success *to help the U.S. to drive and take advantage of the increased pace of technological change*

This NIST assessment of the USMS with its focus on *measurement barriers to technological innovation* is a principal element of that strategy

Purpose of Assessment

- To provide a basis for NIST to be bring the attention of stakeholders, including decision makers in industry and government to systemic issues in the functioning of the nation's measurement system
- To allow NIST to facilitate attainment of solutions to the documented industry measurement problems by engaging potential solution providers
- To serve as a catalyst for identification of the other measurement needs of the nation and other systemic issues within the USMS

Objective of USMS Effort

The objective established by the NIST Senior Management Board was and is for NIST to produce a credible distributable report on a needs-based assessment of the state of the USMS with delivery to the NIST Director in June 2006

Basic Methodology of the Assessment

- Focus on measurement problems that pose technical barriers to technological innovation
- Use industry technology roadmaps, industry-need workshops, and other fact-finding techniques to identify measurement needs
- Conduct an analysis of those industry measurement needs, draw conclusions from them and state them as findings about measurement barriers to technological innovation
- Confirm those findings outside of NIST
- Make judgments about the USMS and technological innovation based upon those findings

NIST USMS Assessment
Case-Study Measurement Need (MN)

Information	Technological innovation at stake
	Economic significance of the innovation
	Technical barrier to the innovation
	Stage of innovation at which technical barrier appears
	Measurement-problem part of the technical barrier
	Potential solutions to the measurement problem
	Potential providers of these solutions
	Government role, if any, in these solutions
Format	One page, crafted, with documented support

NIST USMS Assessment
Roadmap Measurement Need (RMN)

Information	Abstracted from a public available industry technology roadmaps, a description of the new technology the industry is pursuing and the measurement issues that impede the realization of that technology, including measurement problems, usually given in general terms
Format	Text in NIST USMS “Report of Analysis of Industry Technology Roadmaps” and summary entries in spreadsheet table

Authentication of Measurement Needs and Findings

Each Measurement Need and each Finding derived from the set of Measurement Needs is being authenticated

For a Measurement Need, authenticated means verified for fact and confirmed for significance by parties outside of NIST who are knowledgeable and representative

For Findings, authenticated means confirmed to be significant and logically based on facts of measurement needs

Reservations about the Approach

- My understanding was that you had at least two principal reservations about the approach that NIST was taking to its assessment of the USMS.
- One was with the choice of particular sectors for analysis
- The other was with the model of technological innovation to be used

Original Bases as Perspectives for the Survey of the Space of Measurement Needs

Technologies	Broad (including Nanotechnology, Bio-/Medical Imaging, Disaster First-Responder) and Discrete (including Workshop Topics)
Sectors	Semiconductor, Automotive, Software
Disciplines	Physics, chemistry, material science, electrical engineering, civil-mechanical engineering, manufacturing engineering, computer-IT sci-eng
SI Units	Mass, Length, Time, Electrical Quantities, Temperature, Amount Substance, Luminous Intensity

Result of Choice of Perspectives on Sampling of Measurement Needs

- The assessment of the USMS is being based on a sample of the nation's measurement needs related to technological innovation
- The sample has been obtained by looking at the measurement needs of the nation, one of which has been that of particular industrial sectors
- More than 700 unsolved industry measurement problems impeding innovation have been identified, nearly equally divided between case-study measurement needs and roadmap measurement needs
- The sample of the nation's measurement needs cover rather uniformly a broad range of sector and technology areas, independent of the perspectives from which they were obtained

Representation of the Process of Technological Innovation

- To specify measurement problems and so allow analysis, we needed a conceptual representation of the innovation process.
- You had reservations about the one we chose. So did I.
- As a result, we considered and discarded: a 2-stage science and industry one; the original 4-stage research, production, marketing, and use one; and various 5-, 6-, and 7-stage product development ones.
- We ended up with one that deals with: applied research (aimed at realization and commercialization of a particular new technology); production (basically manufacturing); market; and end-use.

Summary Status and Plan

- The NIST USMS Task Group has compiled 700 documented and authenticated industry measurement needs.
- The Task Group has analyzed them and produced provisional findings about measurement barriers to technological innovation
- A small group that constitutes the Report Editorial Committee has produced provisional conclusions about the USMS based upon those findings
- I am to deliver the report on the NIST assessment of the USMS, including those findings and conclusions, tomorrow

Summary Status and Plan (cont)

- It is my understanding that the Director plans to distribute the report to the OU Directors for comment upon receipt of it from me
- I expect to have received and responded to OU Director comments by the third week in July
- I expect that the Director will release the report when it is finalized, possibly in August
- Follow-up actions, specified as the report's Next Steps, will begin at that time.